

cl 11
cont'd
chip contact to a respective conductive terminal on the top surface of the compliant layer, and wherein said elongated bond ribbons extend along the sloping edges of said compliant layer.

Claim 4, line 2, change "the exposed surface" to --an exposed surface--.

Claim 6, line 4, before "terminal positions" delete "the".

Claim 21, line 10, change "selectively forming flexible bond ribbons" to --selectively forming elongated, flexible bond ribbons--; line 11, before "bond ribbons" insert.

Claim 28, line 2, change "the exposed surface" to --an exposed surface--.

In the Specification

Page 11, line 24 after "compliant layer 140." Insert --The elongated bond ribbons 170

cl 2
extend along the sloping edges 145 of compliant layer 140.--

In the Abstract of the Disclosure

Please amend the Abstract of the Disclosure submitted in the Preliminary Amendment dated February 9, 1998 as follows:

Line 10, before "bond ribbons" insert --elongated--.

Remarks

The present Amendment is in response to the Office Action mailed January 25, 2000. A Petition requesting a three-month extension of time to reset the deadline for responding to the Office Action from April 25, 2000, to and including July 25, 2000, is enclosed herewith.

As an initial matter, Applicant notes that claims 1 and 28 have been amended to more clearly point out that bond ribbons 170 (Fig. 2) are "elongated bond ribbons" or "elongated, flexible bond ribbons." Support for this amendment is found in the Specification at, *inter alia*, Figure 2.

The Examiner rejected claims 4, 6, 28 and 29 under 35 U.S.C. § 112, second paragraph, as being indefinite. In response, claim 4 has been amended to change "the exposed surface" to --an exposed surface--, claim 6 has been amended at line 4 thereof to delete the word "the" before "terminal positions", and claim 28 has been amended at line 2 thereof to change "the exposed surface" to -- an exposed surface--. In view of the above-noted amendments to claims 4, 6 and 28, Applicant respectfully asserts that claims 4, 6, 28 and 29

now satisfy the requirements of 35 U.S.C. § 112, second paragraph, and are otherwise allowable.

The Examiner rejected claims 1-4, 6, 7, 11, 21-23, 25-30, 33 and 34 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,070,297 to *Kwon et al.* Referring to Figures 4a-h, *Kwon* provides a method of making integrated circuit testing devices including providing a layer of a compliant material 32 atop a silicone dioxide (SiO_2) layer 34. An active element 36 is disposed between silicone substrate 38 and SiO_2 layer 34. Referring to Figure 4b, vias are formed in compliant layer 32 to expose portions of active element 36. The vias have sidewalls extending between the top and bottom surfaces of compliant layer 32. Metal contact layer 28 and conductive coating 30 are then deposited within the vias in compliant material 32, as shown in Figure 4c. Referring to Figure 4d, a compliant protective coating 26 is then formed atop compliant material 32, metal contact layer 28 and conductive coating 30. Protective coating 26 is then etched to form openings extending to metal contact layer 28. A seed layer is then sputtered over the protective coating 26 to form a connector base 24 in each of the openings in the protective coating 26. A conductive metal layer is then sputtered over connector base 24 to form connector caps 22. Referring to Figure 4h, test probes 16 are then attached to the assembly and electrically interconnected with the conductive metal 28, 30 in the vias. Thus, *Kwon* teaches one to form metallized vias in a compliant layer by first forming the vias and then depositing one or more layers of conductive material in the vias to form the metallized vias.

In contrast, Applicant's claimed invention is directed to selectively forming elongated, flexible bond ribbons over a compliant layer, whereby the elongated bond ribbons extend along the sloping edges of the compliant layer. This is shown more clearly in Applicant's Figures 1A-1E and Figure 2. Referring to Figure 1A, semiconductor chip 100 includes contacts 110 on a contact bearing face 120 of the chip. The semiconductor chip has a central region 115 upon which is formed a passivation layer 130. The passivation layer 130 has apertures for exposing contacts 110. Referring to Figure 1C, a compliant layer 140 having a substantially flat top surface is then formed atop passivation layer 130. The compliant layer

140 is located over the central region 115 of semiconductor chip 100 and is surrounded by the chip contacts 110. Compliant layer 140 includes a substantially flat top surface 147 and gradually sloping edge surfaces 145 that slope between the top surface 147 and the passivation layer 130. Referring to Figure 1D, a plating seed layer 150 is then deposited atop selected portions of compliant layer 140. Referring to Figure 1E, a photoresist 160 is applied to the exposed surfaces of the assembly and the photoresist is then exposed and developed. Elongated bond ribbons 170 are then plated "within defined areas to form conductive pads electrically connecting the chip contacts 110 near a first end region of the ribbons 170 to terminals 175 comprising the second end region of the ribbons." See Specification at page 11, lines 17-20. Figure 2 shows a perspective view of the elongated bond ribbons extending between the chip contacts 110 and terminals 175. As clearly shown in Figure 2, the elongated bond ribbons 170 extend along the sloping edge surfaces 145 of compliant layer 140.

Thus, claim 1 is unanticipated by *Kwon* because the cited reference neither discloses nor suggests the step of "selectively electroplating elongated bond ribbons atop the first dielectric protective layer and the compliant layer . . . wherein said elongated bond ribbons extend along the sloping edges of said compliant layer." Emphasis added. Clearly, the conductive metal layers 28 and 30 deposited over *Kwon's* sidewalls do not form "elongated bond ribbons extend[ing] along the sloping edges of said compliant layer." Indeed, the conductive metal layers deposited on the sidewalls of *Kwon's* vias openings do not form elongated bond ribbons, but rather conical-shaped structures. Such conical-shaped structures are not similar to Applicant's elongated bond ribbons as shown in Figure 2. In addition, *Kwon* provides no teaching or suggestion to form elongated bond ribbons or leads over the sloping edge surfaces of a compliant layer. For all of these reasons, claim 1 is unanticipated by *Kwon* and is otherwise allowable. Claims 2-4 are also unanticipated by virtue of their dependence from claim 1, which is unanticipated for the reasons set forth above. Claim 6 is unanticipated by virtue of its dependence from claim 4, and claim 7 is unanticipated by virtue of its dependence from claim 1.

The limitations recited in claim 11 are shown in Figure 1C of the present application and are described in the specification at, *inter alia*, page 7, lines 5-6. Referring to Figure 1C, compliant layer 140 has a top surface 147, a bottom surface and peripheral edges 145 that slope between the top and bottom surfaces. As set forth in the specification, the sloped peripheral edges provide increased reliability for the bond ribbons formed thereon because the overlying bond ribbons are curved rather than kinked. Specification at page 7, lines 5-6. This limitation is neither disclosed nor suggested by *Kwon* which shows (Figure 4B) that the vias have sidewalls forming acute angles with the top and bottom surfaces of compliant material 32. Thus, claim 11 is unanticipated because *Kwon* neither discloses nor suggests a compliant layer having sloping edges with "a first transition region near the top surface of the compliant layer and a second transition region near the bottom surface of the compliant layer and wherein both the first transition region and the second transition region have a radius of curvature." Emphasis added. Claim 11 is also unanticipated by virtue of its dependence from claim 1, which is unanticipated for the reasons set forth above.

Amended claim 21 is unanticipated by *Kwon* because the cited reference neither discloses nor suggests the step of "selectively forming elongated, flexible bond ribbons over said compliant layer." As mentioned above, bond ribbons 170 (Fig. 2) are elongated and extend along the one or more edge surfaces of the compliant layer. As discussed above, this limitation is neither disclosed nor suggested by *Kwon* which teaches providing conductive metal layers 28 and 30 in vias of compliant material 32 to form metallized vias. Thus, claim 21 is unanticipated by *Kwon* and is otherwise allowable. Claims 22 and 23 are unanticipated by virtue of their dependence from claim 21, which is unanticipated for the reasons set forth above. Claims 25-30 and 33 are unanticipated by virtue of their dependence, either directly or indirectly, from claim 21, which is unanticipated for reasons set forth above.

Claim 34 is similar in scope to pending claim 11. Claim 34 is unanticipated because *Kwon* neither discloses nor suggests a compliant layer having sloping edge surfaces with "first transition regions near the top surface of the compliant layer and second transition regions near the bottom surface of the compliant layer, and wherein both the first and second

transition regions have respective radii of curvature." As discussed above, the sidewalls of *Kwon's* vias form acute angles with the top and bottom surfaces of compliant layer 32. Thus, *Kwon's* sidewalls do not have transition regions with radii of curvature. For all of these reasons, claim 34 is unanticipated by *Kwon* and is otherwise allowable. Claim 34 is also unanticipated by virtue of its dependence from claim 33, which is unanticipated for the reasons set forth above.

The Examiner also rejected claims 5 and 8 under 35 U.S.C. § 103(a) as being unpatentable over *Kwon*. In response, Applicant asserts that claims 5 and 8 are unobvious by virtue of their dependence, either directly or indirectly, from claim 1 which is patentable over *Kwon* for the reasons set forth above.

The Examiner also rejected claims 9, 10, 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over *Kwon*, and further in view of U.S. Patent 5,874,782 to *Palagonia*. The *Palagonia* reference discloses a wafer having elevated contact structures. The Examiner asserts that *Palagonia* teaches a method including a step of dicing and separating a plurality of adjacent compliant semiconductor chip packages 22 arranged in an array on a wafer 20 following the step of forming bond ribbons 26. However, in view of the arguments set forth above, Applicant respectfully assert that *Palagonia* does not overcome the deficiencies of *Kwon*. Thus, claims 9 and 10 are unobvious over the combination of *Kwon* and *Palagonia* and are otherwise allowable. Claims 9 and 10 are also unobvious by virtue of their dependence from claim 1, which is unobvious for the reasons set forth above. Claims 31 and 32 are also unobvious over *Kwon* and *Palagonia* because the combination neither discloses nor suggests the limitations recited in these claims, and by virtue of their dependence from claim 21, which is unobvious for the reasons set forth above.

By separate letter, attached, Applicant has requested authorization from the Official Draftsman to amend Figure 2 to clearly show that elongated bond ribbons 170 extend along sloping edge surfaces 145 of compliant layer 140 to electrically interconnect chip contacts 110 and terminals 175. Applicant will submit amended formal drawings upon receiving the Official Draftsman's approval of the requested changes to Figure 2. Applicant has

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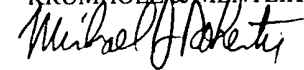
also amended the Specification at page 11, line 24 to discuss the reference numbers which have been added by the Amendment to Figure 2.

As it is believed that all rejections and requirements set forth in the Official Action have been fully met by the foregoing amendment and remarks, favorable reconsideration and allowance of the application is earnestly solicited.

If there are any additional charges in connection with this requested Amendment, the Examiner is authorized to charge Applicant's Deposit Account No. 12-1095 therefor.

Respectfully Submitted,

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